

CLAIMS

What is claimed is:

- 5           1.       A method of automatically determining whether a mesh can be generated by sweeping  
for a representation of a geometric solid, the method comprising the steps of:  
                  classifying surface mesh schemes for surfaces of the representation locally using  
surface vertex types;  
                  grouping mappable and submappable surfaces of the representation into chains;  
                  computing volume edge types for the representation;  
                  recursively traversing surfaces of the representation and grouping the surfaces  
into source, target, and linking surface lists; and  
                  checking traversal direction when traversing onto linking surfaces.
- 10           2.       The method of claim 1 additionally comprising the step of determining that no mesh can  
be generated if a number of chains established in the grouping step is zero.
- 15           3.       The method of claim 1 additionally comprising the step of determining that chains contain  
a consistent ij parameterization.
- 20           4.       The method of claim 1 additionally comprising the step of determining that all  
source/target surfaces sharing edges have a same non-traversed parameter with respect to linking  
surfaces bounding them.
- 25           5.       The method of claim 1 additionally comprising the step of determining that all linking  
surfaces have a globally consistent ij parameterization.

6. The method of claim 5 additionally comprising the step of determining that traversing from a source/target surface over any two edges of a same edge type onto one or more linking surface results in traversing a non-traversed parameter in a same direction.

5 7. The method of claim 5 additionally comprising the step of determining that traversing from a source/target surface over any two edges of a different edge type onto one or more linking surfaces results in traversing a non-traversed parameter in an opposite direction.

8. The method of claim 1 wherein in the computing step the volume edge types comprise end, side, corner, and reversal.

9. The method of claim 1 wherein in the computing step the volume edge types are not computed until it is verified that chains are complete.

10. The method of claim 1 additionally comprising the step of determining that no mesh can be generated if in the traversing step a surface is encountered which should be submappable and part of a chain but is not.

11. A method of automatically determining an order in which to mesh surfaces of a meshable representation of a geometric solid, the method comprising the steps of:

performing the steps of claim 1; and

recursively traversing the source and target lists.

12. Computer software for automatically determining whether a mesh can be generated by sweeping for a representation of a geometric solid, said software comprising:

means for classifying surface mesh schemes for surfaces of the representation locally using surface vertex types;

5 means for grouping mappable and submappable surfaces of the representation into chains;

means for computing volume edge types for the representation;

means for recursively traversing surfaces of the representation and grouping the surfaces into source, target, and linking surface lists; and

10 means for checking traversal direction when traversing onto linking surfaces.

13. The software of claim 12 additionally comprising means for determining that no mesh can be generated if a number of chains established by said grouping means is zero.

15 14. The software of claim 12 additionally comprising means for determining that chains contain a consistent ij parameterization.

20 15. The software of claim 12 additionally comprising means for determining that all source/target surfaces sharing edges have a same non-traversed parameter with respect to linking surfaces bounding them.

16. The software of claim 12 additionally comprising means for determining that all linking surfaces have a globally consistent ij parameterization.

25 17. The software of claim 16 additionally comprising means for determining that traversing from a source/target surface over any two edges of a same edge type onto one or more linking surface results in traversing a non-traversed parameter in a same direction.

18. The software of claim 16 additionally comprising means for determining that traversing from a source/target surface over any two edges of a different edge type onto one or more linking surfaces results in traversing a non-traversed parameter in an opposite direction.

5 19. The software of claim 12 wherein in said computing means the volume edge types comprise end, side, corner, and reversal.

20. The software of claim 12 wherein in said computing means the volume edge types are not computed until it is verified that chains are complete.

10 21. The software of claim 12 additionally comprising means for determining that no mesh can be generated if said traversing means encounters a surface that should be submappable and part of a chain but is not.

15 22. Computer software for automatically determining an order in which to mesh surfaces of a meshable representation of a geometric solid, said software comprising:

software of claim 12; and

means for recursively traversing the source and target lists.